Brianna DeSantis

Lesson 1 – Unit 6

6th grade life science

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| UNIT: 6 – Cells | |
| **Date: Week of 3/24** | *Lesson topic(s) and Essential Question(s):*  **Topic** – Cell membrane and diffusion vegetable lab  **Questions** – What is diffusion? What is osmosis? What is a selectively permeable membrane? How do small particles get in and out? How do large particles get in an out? How can we compare the results of vegetables placed in salt water and regular tap water? How can we quantify diffusion and analyze the data? How do we show a mass and length change in a bar graph? |
| **Misconceptions about diffusion** | Salt moves in and out of cells, rather than water.  Plant cells burst and shrivel. |
| **Aim** | How do the mass, length and appearance of vegetables change when they are placed in different solutions? |
| **Objectives** | Students will demonstrate knowledge by understanding the difference of the effects of salt water and regular water on vegetables on a macro-scale level. They will measure mass, length and appearance as away of comparing and create bar graph to compare changes. |
| **Do Now** | 1. Write down homework in planner 2. Write down date, AIM, heading in notebook 3. Define hypertonic and hypotonic. What do you think isotonic means? |
| **Standards Addressed:** | 1.1a Living things are composed of cells. Cells provide structure and carry on major functions to sustain life. Cells are usually microscopic in size.  1.1b The way in which cells function is similar in all living things. Cells grow and divide, producing more cells. Cells take in nutrients, which they use to provide energy for the work that cells do and to make the materials that a cell or an organism needs. |
| **Teacher Competencies** | 1e – Designing coherent instruction |
| **Procedure:**  **Activities & Tasks**   |  |  |  | | --- | --- | --- | | ***Time*** | ***Activity*** | ***Materials*** | | 5 min | Remind students to write down homework, AIM and answer the DO NOW. |  | | 5 minutes | Students write down answer to the DO NOW. |  | | ~5 minutes | Go over DO NOW | Student volunteers | | ~5 minutes | Explain activity – students follow the procedure in their lab manual (see next few pages) | hand out materials (cups with salt water and regular water, celery, triple beam balances, lab manuals) | | ~20 minutes | Day 1: Students record detailed observations in their lab manual.  They get the mass, length and take qualitative observations.  Day 2: Students get mass, length again and record results. They create a bar graph to show mass and length change. | Triple beam balances, rulers, salt, etc (see lab manual)  Graph paper | | |
| **Differentiation** | Demonstrate osmosis using celery and/or carrots as a model organism. Model for students how to use triple beam balances using an online simulation and give extra practice for students who need it.  For higher level students, have them compare the difference of plant growth after adding specific nutrients, such as sugar and fertilizer (have students plant the plants and compare roots) |
| **Assessment** | Questioning (formative)  Lab report on diffusion (see rubric) |
| **Homework** | Homework (read section 1 of chapter 4, make a venn diagram for the difference between the movement of small and large particles across a membrane) |

**Lab Activity (see next page)**

Laboratory Report Rubric

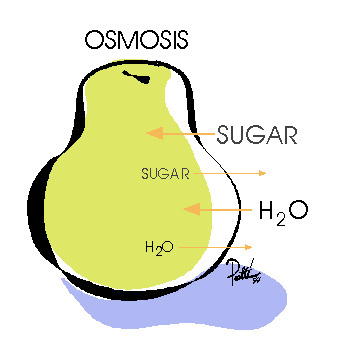
|  |  |  |
| --- | --- | --- |
| ***Heading/Section*** | ***Description*** | ***Points*** |
| Title Page | * Title page with name, class, and date * Creative title and design | 5 points |
| Problem | * In the form of a question * Uses a question mark * Similar to question presented in class | 5 points |
| Research | * Answers to research questions * Defines key words or terms * Based on class notes or reading * Lists sources used to find information | 20 points |
| Hypothesis | * Gives a possible answer to the problem and a reason why. * More than one sentence to explain. * **Reason is based on research**. | 15 points |
| Procedure | * Steps listed with numbers or bullets. * Detailed enough that it could be repeated exactly. * In past tense | 5 points |
| Quantitative Data | * Includes units * Organized in a table with a title * Headings for columns and rows | 10 points |
| Qualitative Data | * Organized in a table or chart OR * Each item separately described and observed * **Detailed descriptions** * May include diagrams or pictures | 10 points |
| Data Analysis | * Labeled graph: title, X and Y axis labeled, key labeled * Bar graph or line graph used depending on class discussion * Completed on graph paper or computer | 10 points |
| Conclusion | * Questions written and answered * **Refers specifically to data** and results to support answers | 15 points |
| Format | * Each heading is written clearly and boldly and perhaps underlined or boxed * Written sections must be typed * You may insert separate drawings and graphs | 5 points |

Unit: Cells Date:

Text Book Pages: 84-87

Lab #3: Osmosis in Vegetables

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Prelab: To be completed before coming to lab.

Background:

Cells perform many processes to keep themselves alive and to keep the organism they are a part of alive. One of these processes is moving molecules into or out of the cell through the cell membrane. Nutrients need to move into the cell and it is important that the cell is filled with 70% water. When substances pass through the cell membrane (either into the cell or out of it) without using energy, it is called passive transport. Diffusion of molecules like oxygen or carbon dioxide does not require energy. When the molecule is specifically water, diffusing across a membrane, it is called osmosis. Active transport can happen for large molecules like glucose. It can also happen when molecules need to move from where there are a little, to where there are a lot.

Osmosis happens in plants when they need water from soil. We know a plant needs water because its leaves and stem seem wilted and limp. Once it is watered, the leaves and stem seem to perk up or seem more full. What’s happening at a molecular level? When the plant cell lacks water, its vacuoles shrink and the cell membrane gets pulled inward. There is less pressure and the cell looks limp. This is called flaccid or plasmolysed. As the cell absorbs water molecules through osmosis, the vacuole fills and pushes against the cell membrane. The cell becomes full and inflated. This is called turgid. The pressure of the water on the cell membrane and cell wall is called turgor pressure. Because the leaves and stem are made up of these cells, the entire structure becomes limp or inflated based on the amount of water in the cell. This happens in animal cells like blood cells as well. When would a blood cell become plasmolysed?

Problem: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Research: Answer these questions in 2-3 sentences. The answers can be found in your textbook, in the classroom textbook the article about investigating osmosis in plant cells or go to biologycorner.com/bio1/diffusion.html.

1. What needs to get into cells?

2. What needs to get out of cells?

3. What do these molecules pass through?

4. Describe parts of the cell membrane?

5. What little molecules pass through the cell membrane?

6. How do big molecules pass through the cell membrane?

7. Why doesn’t everything leave a cell?

9. What form of transport is the movement of oxygen from one cell to another?

10. What is plasmolysis?

11. What is turgor pressure?

12. What process would happen to a plant cell if its vacuole did not have a lot of water?

13. Draw the following, make sure to label the cell wall, cell membrane, vacuole and water molecules.

a. A plant cell with a balanced amount of water.

b. A plant cell without a lot of water.

c. A plant cell with too much water

14. When is a situation that a plant would lose water?

15. When is a situation that a plant would gain water?

Variables:

Independent Variable: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Dependent Variable: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

What are the controlled variables?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Hypothesis:

1. If a fresh vegetable piece is put in salt water, how will its characteristics change? You may add a diagram of the plant and plant cell to explain.
2. If a vegetable piece is put in regular water, after being left out for a day, how will its characteristics change? You may add a diagram of the plant and plant cell to explain.

Lab Activity: To be completed in class.

Procedure:

1. Obtain two pieces of celery.
2. Weigh each piece in grams.
3. Record the weight in your data table.
4. Measure the length of each piece in centimeters.
5. Record the length in your data table.
6. Follow the directions of making qualitative observations.
7. Label both cups with your name, class # and today’s date.
8. Label one cup “salt water” and one cup “tap water.”
9. Place a piece of celery in the “salt water” cup.
10. Place a piece of celery in the “tap water” cup.
11. When your teacher says to, put the cups on a side table.
12. Wait 24 hours.
13. Take the celery pieces out of the “salt water” cup and place on a paper towel.
14. Weigh them in grams and measure their length in centimeters.
15. Record on the data table.
16. Repeat steps 13-15 for the vegetables in the tap water cup.
17. Make your qualitative observations.

Quantitative Data:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Mass  Day 1 | Mass  Day 2 | **Change in Mass** | Length  Day 1 | Length  Day 2 | **Change in length** |
| Celery in Salt water |  |  |  |  |  |  |
| Celery in Tap water |  |  |  |  |  |  |

Qualitative Data:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | What is the color of the vegetable? | Can you squeeze it easily? | Can you bend it easily? | Does it seem puffy? | Additional observations |
| Celery in Salt water day 1 |  |  |  |  |  |
| Celery in Salt water day 2 |  |  |  |  |  |
| Celery in Tap water day 1 |  |  |  |  |  |
| Celery in Tap water day 2 |  |  |  |  |  |

Analyzing Data:

* Create 2 different bar graphs to show the change in mass and the change in length of the celery in the different solutions.

Conclusion: Answer the following questions in 2-3 sentences each.

1. What were the final results of the lab, in other words how did the vegetables change in salt water and how did they change in tap water?
2. How did you know your hypothesis was right or wrong? Refer specifically to your data.
3. Think about the elodea cells and compare them to the celery cells. What do you think was happening to the vegetable cells? Use the words plasmolysis and turgid.
4. In which vegetables did water move in to the cells? In which vegetables did water move out of the cells?
5. Why did water move in or out of the vegetables in salt water?
6. What did you learn from this activity?
7. What new thoughts/ ideas or questions did you come up with during this investigation and after it?

Lab Report Due Date:\_\_\_\_\_\_\_